H

Ecohistory Program

Program Director **TANIGUCHI Makoto**

The Ecohistory Program investigates circulation, diversity, and resources in terms of historical time. Behind every problem (or phenomenon) there lies, in some measure, the issue of historical causality; this fact underscores the need to comprehend the present through investigation of the past (in Japanese this idea is described by the phrase *onko chishin*). As its specific goal, this program contributes its long-term historical and civilizational perspective to contemporary and future societies. Like all RIHN research programs, it should elucidate global environmental issues, propose solutions and deepen understanding of human-environmental potential.

Focusing on different regions and a range of historical moments, current projects in the Ecohistory Program address the environmental histories of two distinct areas, what might be called the "Asian Green Belt" and the "Eurasian Yellow Belt". In the former, generally speaking, communities managed to maintain sustainable livelihoods for a period of approximately 10,000 years. In the latter area, many civilizations collapsed within this same period of time. But is this reading of history correct? What distinguishes the conditions of productivity and sustainability between these two regions? This latter question is, ultimately, at the core of this research program; its answer is surely indispensable to human futurability.

Completed Research	Leader	Title
H-02	**SATO Yo-Ichiro**	Agriculture and Environment Interactions in Eurasia
Full Research	**Leader**	**Title**
H-03	**OSADA Toshiki**	Environmental Change and the Indus Civilization
H-04	**UCHIYAMA Junzo**	Neolithisation and Modernisation

Agriculture and Environment Interactions in Eurasia: Past, Present and Future
—A ten-thousand-year history

Agriculture represents a fundamental change in relations between humanity and nature. This research project examined historical interplay of agriculture and environment, focusing on the relation between climate, crops and food consumption in three major agricultural zones of Eurasia: the rice, Mugi, vegeculture zones. Project research was designed to reconstruct the human-environmental histories of these zones in the last ten-thousand years. We suggest that such histories can provide important insight into the contemporary and future challenges to agricultural production and food consumption.'Genetic diversity' was s a key concept in the study.

Project Leader: **SATO Yo-Ichiro** RIHN

Project achievements

Project research successfully modeled agriculture-environment interactions involving multiple inter-woven factors, or what was termed the "Human Food Web". Based on extensive field work and genetic analyses conducted on materials collected from all three agricultural zones, it was clearly shown that genetic diversity has decreased significantly in the course of agricultural development. Past collapses of food production indicate that epidemics were a substantial threat. The past suggests that current losses of genetic diversity increase the risk of collapse in agricultural production.

In the Rice Zone, natural and human disasters frequently disturbed food production. Following disaster, however, human societies were able to recover production through the use of various techniques (called *shinogi* in Japanese) adapted through history. Such techniques can teach much to contemporary observers of food production. In the *Mugi* Zone, fieldwork revealed that the desert found throughout the region today is the result of past human over-use of lands in agriculture. This finding was based on substantial new data obtained by our research team. Such histories should lead to greater awareness of potential agricultural crisis and encourage critical reconsideration of our present agricultures. Research conducted in the Vegeculture Zone shed light on the origins of vegeculture, demonstrating that the process of plant domestication was a means of long-term environmental adaptation.

In total, our research indicates that in order to maintain food production and to address the difficult contemporary global environmental problems that humanity confronts today, we should not seek to "control" nature, but to coexist with nature. Specialists in agriculture should therefore promote the production of genetically diverse cultivars suited to local environments, and rooted in local traditional cultures. Project researchers have presented this message to the public through a number of publications (e.g. "Agricultural History in Eurasia" Vols. 1-5, 2008-2010) and a special exhibition at the National Museum of Nature and Sciences entitled "Food for Tomorrow: Biodiversity and Sustainability" (September 2010 – January 2011), which was viewed by more than 143,000 visitors.

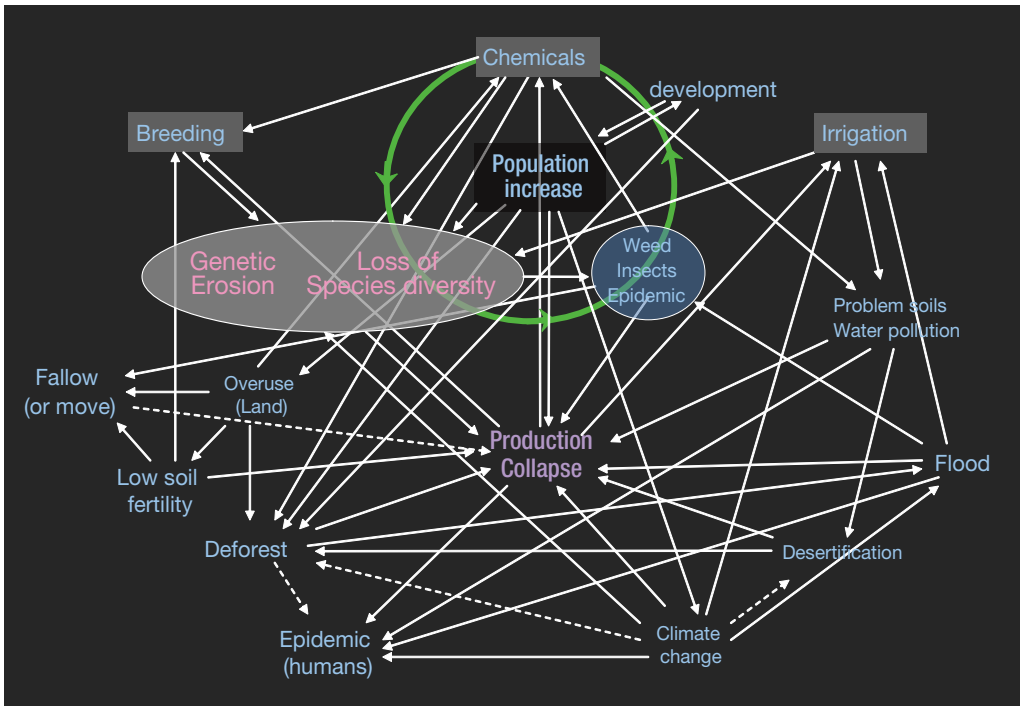

Figure 1 **Human Food Web**

The model indicates that the agricultural collapse is a key element in the Web. Collapse is both a cause and an effect of other events.

Environmental Change and the Indus Civilization

The Indus Civilization (2600 BC – 1900 BC) is one of the four great ancient civilizations. It is known for its cultural and technological achievements — its characteristic seals and scripts, fortified settlements and drain systems — and also for its brief tenure. The Indus civilization spread over an area of 680,000 km^2 along the Indus and Ghaggar-Hakra rivers and into Gujarat in Western India, but its urban phase lasted only 700 years, much shorter than any of its contemporaries. Drawing on archaeology, Indology, and palaeo-environmental investigation, this project reconstructs the social and environmental histories of several key Indus areas, and attempts to determine whether and how environmental factors contributed to their short life and rapid decline.

Project Leader
OSADA Toshiki RIHN

I am a linguist and have worked among the Munda people of Jharkhand, India. I spent more than six years in India in the 1980s. The Munda appear to be one of the longest resident peoples of India (their linguistic roots may be traced back to the Indus civilization, the earliest civilization on the subcontinent). I joined RIHN in 2003 and proposed this project shortly thereafter in order to apply the combined insights of linguistics and archaeology to the mystery of Indus civilization decline.

Sub-Leader
ONISHI Masayuki RIHN
Core Members
GOTO Toshifumi Tohoku University
KHARAKWAL, Jeewan Singh Rajasthan Vidyapeeth, India
MALLAH, Qasid Shah Abdul Latif University, Pakistan
MASIH, Farzand Punjab University, Pakistan
MAEMOKU Hideaki Hiroshima University
OHTA Shoji Fukui Prefectural University
SAITOU Naruya National Institute of Genetics
SHINDE, Vasant Deccan College, Deemed University, India
UNO Takao International Research Center for Japanese Studies

Project structure and objectives

This research project examines the social character and environmental context of the Indus civilization and attempts to determine how they are related to the civilization's short life and rapid decline. In particular, we aim to evaluate the impact of environmental change on the subsistence economy and trade network that sustained the Indus civilization's urban system. Our research will also provide data on the long-term processes of climate change in South Asia. Such data will help us develop historical perspective on, and practical understanding of, contemporary environmental problems in the region.

As shown in Fig. 1, our project collaborates with several universities and institutes in India and Pakistan as MOU partners. The project is divided into five research groups: (1) the Palaeo-Environmental Research Group (PERG); (2) the Material Culture Research Group (MCRG); (3) the Subsistence System Research Group (SSRG); (4) the Inherited Culture Research Group (ICRG); and (5) the DNA Research Group (DNAG). PERG analyzes palaeo-environmental data obtained from coring and other field study and MCRG works on cultural and biological data collected through archaeological excavations at Farmana (Haryana, India) and Kanmer (Gujarat, India). SSRG conducts both archaeo- and ethno-botanical study, while ICRG analyzes linguistic data obtained from ancient texts and field research. The newly formed DNAG is now conducting analysis of the human and cow bones discovered at the Farmana site. Each of these research groups uses its own methodology to investigate the following important subjects: ancient climate change; avulsion of the Ghaggar River; sea level change in Gujarat; and crop distribution in relation to the environment across the Indus region.

Major achievements

As regards the study of the natural environment surrounding the Indus civilization, PERG has produced a preliminary analysis of the sediment core samples obtained from the Rara Lake in the Lesser-Himalayan region in 2009. The sample reveals the overall monsoon pattern in South Asia in the last 4,500 years (Fig. 3). We wait for the results of further analysis of these data.

PERG has also established through the dating of sand dunes that, contrary to its description in the Rig-Veda text (which was transliterated by ICRG), the Ghaggar was not a large river, but a small one capable of providing water for agriculture only during the monsoon season. This finding indicates that the Indus civilization was not as dependent on large rivers as were the three other great ancient civilizations. MCRG analysis of archaeological artefacts from the Farmana site gives a good description of the resource base, society and economy of this region during the Indus period.

Figure 1 **Organization of research**


The Coastal Indus Looks West

Photo 1 **From SCIENCE 328:1100 (2010)**
Reprinted with permission from AAAS

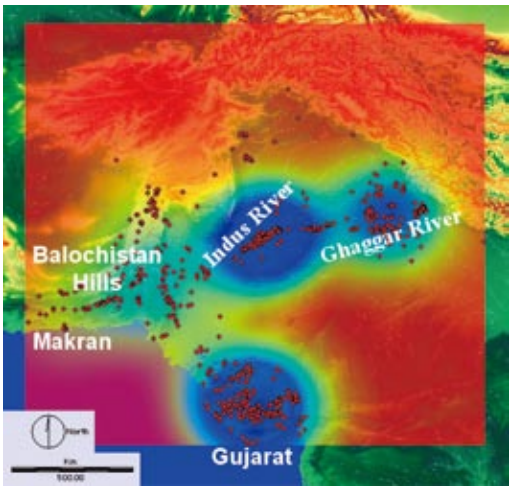

Figure 2 **Distribution and concentration of the Indus sites** (adapted from Teramura and Uno 2006)

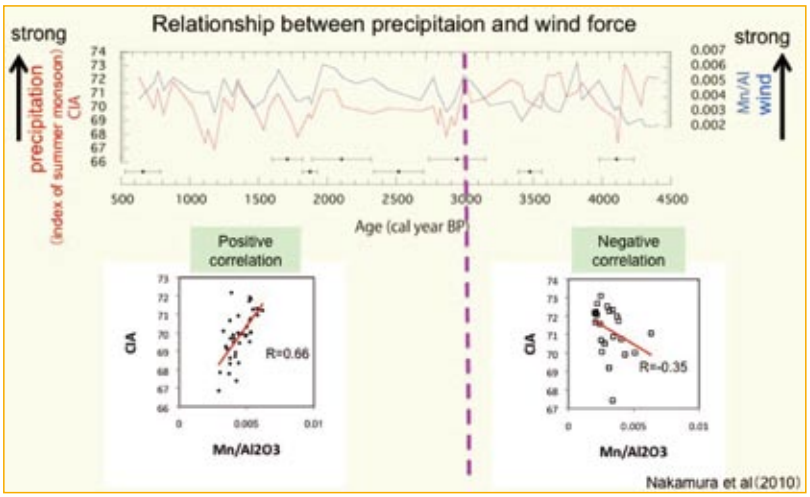

Figure 3 **Results of the preliminary analysis of a sediment core from Lake Rara** (Nakamura et al., 2010)

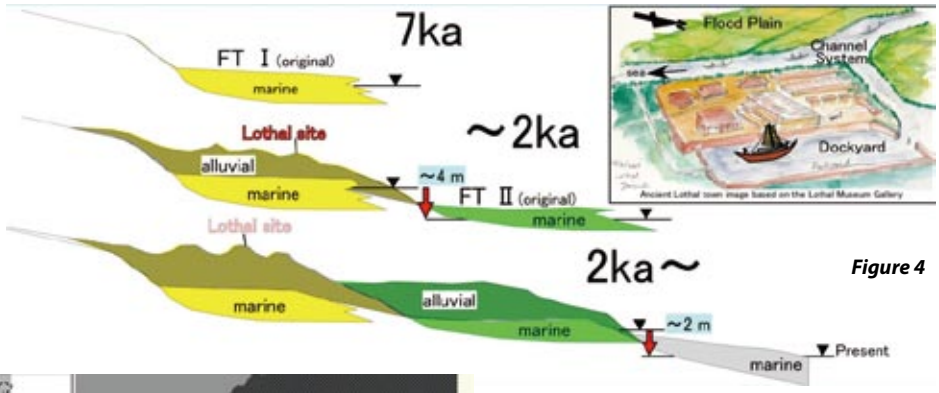

Figure 4 **Relative sea level change at Lothal (Gujarat)** (Miyauchi et al., 2010)

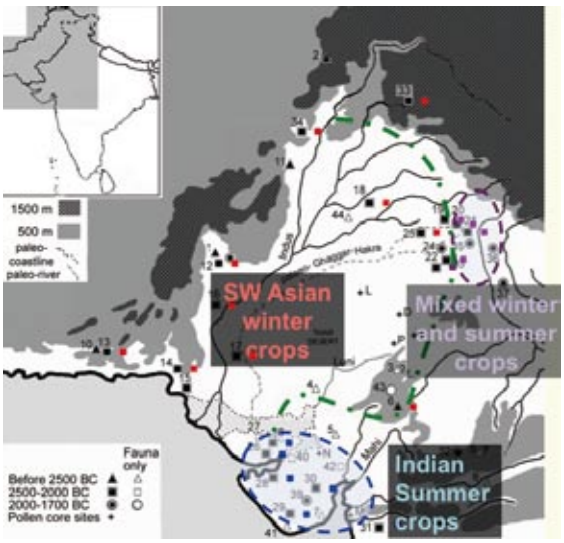

Figure 5 **Geographical distribution of crops in the Indus region** (adapted from Fuller 2006)

Another PERG team investigating the palaeo-coast of Gujarat has collected geological and topographical field data and analyzed satellite imagery. Their findings coincide with the result of hydro-isostatic modelling, suggesting that sea level in the Indus period was about two meters higher than it is in present-day Gujarat. Thus the ancient seaport of Lotal, Gujarat, an important base for trade with Mesopotamia, would have become inaccessible by the end of the Indus period (Fig. 4). The study of cuneiform texts conducted by ICRG members and archaeological data obtained at the Kanmer site help us establish the local evidence of this historical change.

Excavation at Farmana and Kanmer has now concluded. The MCRG uncovered a number of important structures and artefacts, including three seal-like pendants with Indus scripts (reported in *Science* in May 2010, cf. Photo 1), as well as many plant and animal remains. Analysis of these data will be published in two volumes in spring 2011 as part of the project's final report. Botanical research conducted by SCRG and philological research conducted by ICRG has allowed us to gradually reconstruct the ancient environment, subsistence systems and trade network of the Indus civilization, which show enormous diversity. For example, palaeo-botanical research conducted by SCRG established the geographical distribution of cultivated plants during the Indus period. Divided into winter, summer and mixed-crop regions (Fig. 5), the ancient boundaries roughly correspond to the present-day climate zones of South Asia. The ICRG linguists' subgroup published *The Language Atlas of South Asia*. A future task is to integrate SCRG's ethno-botanical data into this work.

Future activities

Major activities of each research group have concluded. The few remaining research tasks, such as the oxygen isotope analysis of otolith and DNA analysis of the human and cow bones, are pending laboratory results. We are now integrating all the findings of individual research groups into a Geographic Information System (GIS) in order to present a comprehensive picture of the Indus civilization and its decline.

Project findings have been consistently published in our Occasional Papers and Manohar Indus series and as many individual books and academic papers. Such publications will continue until the end of the project. PERG will present the outcomes of its palaeo-environmental research in a number of international conferences, including at the European Geosciences Union and as a special session at the American Geophysical Union 2011, and will subsequently publish these findings in major academic journals.

Neolithisation and Modernisation: Landscape History on East Asian Inland Seas

This project aims at reconstructing historical landscape change in the Japan Sea and East China Sea areas. Our research concentrates on two periods of revolutionary landscape change, Neolithisation and Modernisation. The present project uses a holistic human sciences perspective to explicate the formative history of the present-day landscape and to offer new insight into the concept of the "cultural landscape".

Project Leader
UCHIYAMA Junzo RIHN

Junzo Uchiyama is an environmental archaeologist. He received his MA from Durham University, UK in 1996 and his Ph.D. from the Graduate University for Advanced Studies (Japan) in 2002. He is particularly keen on investigation of landscape changes in the Jomon period and assessing land use patterns based on the analysis of zooarchaeological assemblages.

Sub-Leader
LINDSTRÖM, Kati Institute of Philosophy and Semiotics, University of Tartu
Core Members
BAUSCH, Ilona Faculty of Archaeology, Leiden University
FUKASAWA Yuriko Graduate School of International Cultural Studies, Tohoku University
GILLAM, Christopher South Carolina Institute of Archaeology and Anthropology, University of South Carolina
HARUTA Naoki Faculty of Education, Kumamoto University
HONG, Sungheup Department of Anthropology, Chonnam National University
HOSOYA Aoi RIHN
IIDA Taku National Museum of Ethnology
IKEYA Kazunobu National Museum of Ethnology
KANER, Simon The Sainsbury Institute for the Study of Japanese Arts and Cultures
KIM Jangsuk Department of History, Kyung Hee University
KOYAMA Shuzo RIHN
MAKIBAYASHI Keisuke RIHN
NAKAI Seiichi Faculty of Humanities, Toyama University
NAKAJIMA Tsuneo RIHN
NAKAMURA Oki RIHN
POPOV, Alexander Museum of Archaeology and Ethnography, Far East National University
SEGUCHI Shinji Shiga Prefecture Cultural Properties Protection Association
YASUMURO Satoru Faculty of Economics, Kanagawa University
ZEBALLOS VELARDE, Carlos Renzo RIHN

Research background and objectives

Project focuses on the landscape change in the East Asian Inland Seas (Fig. 1a), a region of rich cultural and landscape diversity, from the end of Ice Age up to the present day, with particular emphasis on the processes of Neolithisation and Modernisation. We hope to develop a more subtle and profound understanding of landscape and environmental issues in this region, and so to inform a solid landscape protection and development agenda.

Earlier described as a static composition, landscape is now considered as an evolving, recursive process of interaction between the physical environment found in a certain place and the culture and the value system of the people who inhabit it (Fig. 2). In the course of their everyday activities, people apply their environmental perceptions and skills to change their environment according to their values and beliefs. The resulting landscape will become the nexus of identity for the next generation, which will in turn alter its environment according to its abilities and imagination. Since landscapes are the stages of everyday life, landscape study can reveal how and why environmental issues arise and can best be addressed. Understanding the historical and cultural processes involved in landscape formation will help contemporary societies to address the disappearance of landscape diversity and design well-grounded landscape protection policies for the future.

Results to date

The project has eight regional work groups, each carrying out research in a key area of the East Asian Inland Seas (Fig.1b). Research focuses on four umbrella topics: (1) The birth and expansion of agriculture; (2) Waterfronts, including water bodies, waterways and rice paddies; (3) Migration and colonisation as forces of landscape change;

Figure 1a East Asian Inland Seas and Eight NEO-MAP Research Areas

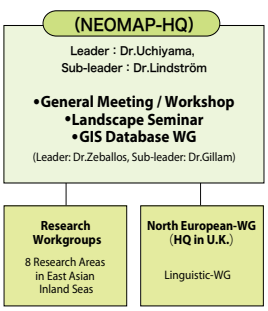

Figure 1b NEOMAP *Organization*

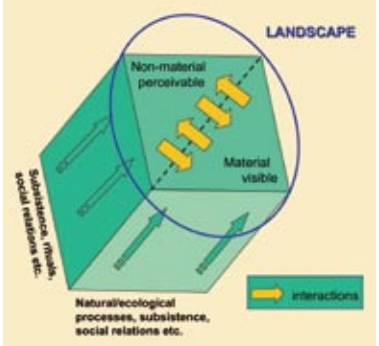

Figure 2 Concept of Landscape

Photo 1 **Shirakawa Village, Japan**

Photo 2 **Research at Boisman Shell Mound in Primorye, Russia**

(4) Travel and creation of mental landscape images. Special attention has been paid to three following major aspects of landscape formation in the region.

(1) Modernisation as seen from Neolithisation

What do the landscape changes associated with Modernisation have to do with Neolithisation? It was previously thought that the "Neolithic revolution," when agricultural societies and large-scale settlements emerged and the basic elements of modern landscapes were established, was an event that occurred in a relatively short period of time. If, however, we refer to humankind's increasing capacity to exploit their environments compared to earlier hunter-gatherer societies, "Neolithisation" should be defined as a process of human adaptation to the natural environment since the end of the last Ice Age. As aggressive resource use and increasing regional interdependency are characteristic of the present day as well, the period of Modernisation can be seen as a climax—or intensification of—Neolithisation.

(2) The cultural functions of inland seas

Seas have an immeasurable impact on their surrounding landscapes. Our Hokkaido workgroup describes how inland seas enable migrations and new colonisations, transforming indigenous spiritual and sustenance landscapes and imposing new settler landscapes. Okinawa, in contrast, was positioned as an outpost of trade between Japan and China. Its extensive coastlines and marine environments have shaped the regional landscapes from within, bringing about specific regional sustenance patterns and religious world views. At times, the maritime and continental influences interact, as in the Primorye Region, where the continental influence of Korean settlers blended with that of the new European settlers who arrived across the sea.

(3) The creation of mental landscape images

What is the impact of culture's mental structures on landscapes? What do great cultural systems like religion have to do with landscape and environmental issues? We explore one instance in Japan. With the rise of Buddhism in the Nara period (AD 710-794), the killing of living beings, including animals and fish, was prohibited. Since the Middle Ages, hunting and fishing were strictly prohibited within 2 li (roughly 1.3 km) of the temples, but this area was gradually redefined according to the area directly visible from the temple. Both the ban and its gradual redefinition, have had a large impact on resource use and the natural environment of the Japanese archipelago.

Topics for the future

NEOMAP researchers participate in many public events designed to increase public awareness about landscape and environmental issues. As visualization is a useful tool for making specific historical data accessible to non-academic audiences, in the next years our publications will emphasize the creation of landscape database and atlas. Superimposing the landscapes of Neolithisation and Modernisation on one single map can lead us to new discoveries about historical human-nature interrelationships and enhance consciousness about environmental issues.

We also hold regular seminars in and outside RIHN and present our results at international worskhops and symposia. NEOMAP is active in international collaboration, and has organised joint activities with scholars from Estonia, Belgium, Holland, UK and Germany.